HAB APRS Tracker

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TOOLS:

- Desoldering tool (1)
- Dremel (1)
- Drill & drill bits (1)
- PC & printer (1)
- Soldering iron (1)

PARTS:

- Clear adhesive labels (1)
- Byonic's MT-300 (1)
- Altoids sized tin (1)
- DB-9 solder cup (1)
- Double sided tape (1)
- DC power connector (1)
- SMA bulkhead connector (1)

SUMMARY

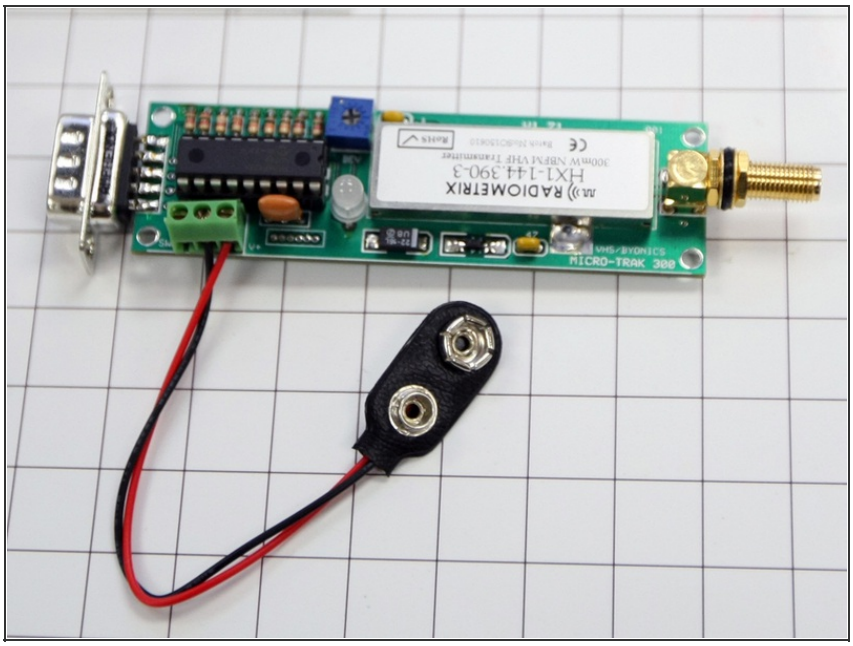
You don't just wake up one day and decide you are going to send a camera into space. But I kind of did. I teach high school at Beaufort High in Beaufort, South Carolina. I think it was the first or second day of the Christmas break for the 2009-2010 school year that I was having coffee one morning and reading an online photography forum, Photography on the Net. That's where I ran across a small post that basically said, "Look at this link! It's cool." The link was to the 1337 Arts site; the guys from MIT that put a camera into space attached to a weather balloon. My first thought was, "Hey, I could do that!" Then it occurred to me that I could do that with the photography class I was teaching. So, it changed to, "We could do that!" And we did.

This project is actually the culmination of a lot of smaller projects. I've tried to separate them into a few projects of a manageable size.

The first problem to be solved was how to track the payload across the sky, allowing us to recover it. We could have used a smart phone running any number of apps that would transmit location, but the GPS in smart phones won't transmit above 60,000 feet. There is a government regulation that says that a GPS must not work if it is moving faster than 1,200 mph and above 60,000 feet. Basically, they don't want anyone making a DIY GPS-guided missile.

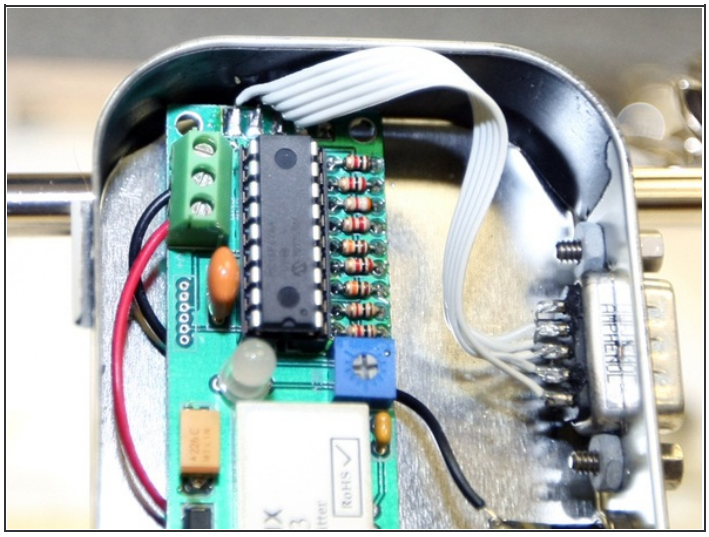
The answer was a non-cellular tracker using a GPS that is unlocked for altitudes above 60,000 feet attached to a VHF data transmitter.

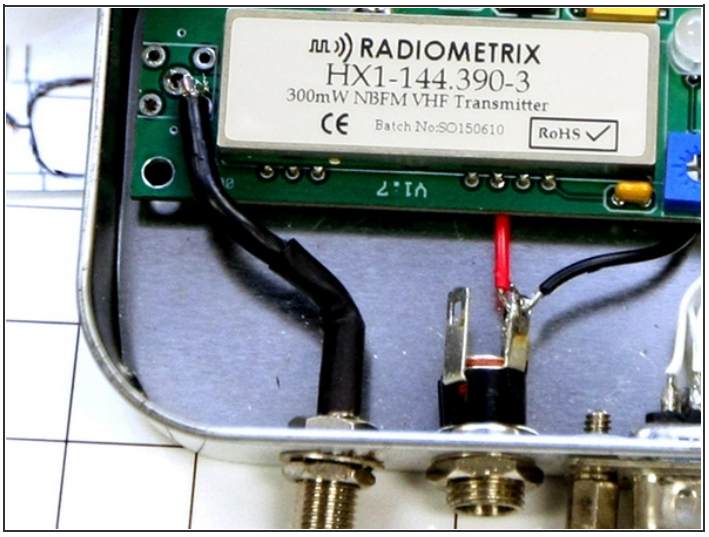
Step 1 — Deconstruct the MT-300



- Get yourself an MT-300.
- Once you have the MT-300 the first thing that needs to be done is to remove the 90-degree SMA connector that comes attached to one end of the board.
- Sometimes the DB-9 connector comes soldered to the board. If it's soldered, it has to be desoldered and removed. If it is just wedged on, pull it off.

Step 2 — Attach all the wires



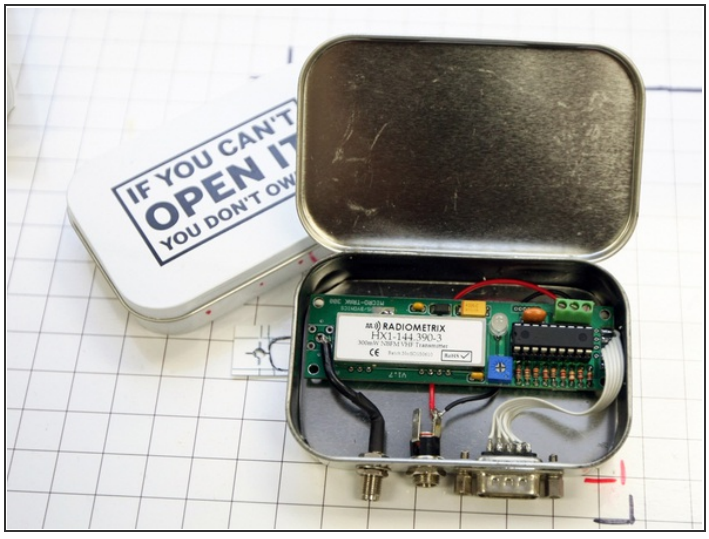


- Although the DB-9 has cups for nine wires, you only need to attach four:
  - Pin 2: Serial Data In (GPS and programming)
  - Pin 3: Serial Data Out
  - Pin 4: + 5 Regulated output (optional for GPS power)
  - Pin 5: Ground
- Attach two wires to the three-screw input terminal; one for the power and the other for the ground.
- Solder a short length of cable and attach it to the RF output.

Step 3 — Prepare the tin

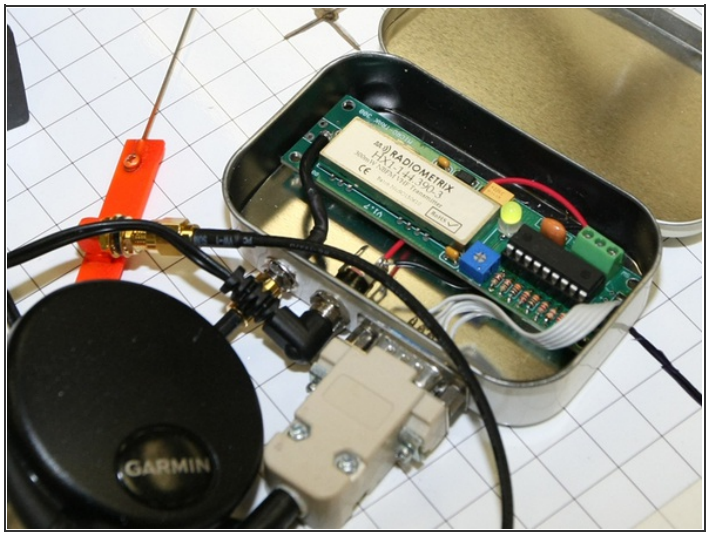

- The holes for the antenna and power connector can be drilled. The easiest way to create the opening for the DB-9 is to cut it with a Dremel tool.
- Paint over the lovely label that comes on the Maker: tin. Then take your favorite high altitude balloon club logo, print it on a clear adhesive label and apply it to the lid.

Step 4 — Put it all together



- Once the holes are cut into the tin you can attach the DB-9 solder cup connector, the DC power connector and the SMA bulkhead connector.
- A few pieces of double-sided tape are used to raise the board off of the tin.
- A liner of electrical tape is used to insulate the inside of the box.
- Now the device can be powered up and programmed. Be careful not to power up the transmitter without an antenna attached.

Step 5 — Notes



- To use this device as an APRS transmitter you will have to attach it to a GPS. I use a Garmin 18x LVC. There are lots of others out there and a quick Google search will help you find them. Just make sure the one you use will work over 60,000 feet. Not all will; see here for more info.
- The MT-300 is no longer in production. Byonics is currently working on a dedicated high-altitude balloon tracker. If you can't wait, there is the MT-RTG (Ready to Go) by Byonics.
- For this project I used Byonics products. There are lots of other companies that make hardware that can be used for APRS transmitters. I like Byonics because they make good products that are reliable and their support is top-notch. They also get them to you quickly.

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